could learn from him, there ſeemed to be no reaſon for this ſuppoſition. He is long ſince perfectly recovered.

I am, Sir,

Your moſt obedient

Moſt humble ſervant,

Charlton Wollaſton.

XCVIII. *Obſervations on the Tides in the Iſland of St.* Helena: *in a Letter from the Rev.* Nevil Maſkelyne, *A. M. F. R. S. to* Thomas Birch, *D. D. Secretary to the Royal Society.*

Reverend Sir,

Read Nov. 18, 1762.

NOT having met with any obſervations of the tides made in a place ſo near the line as this, or at an iſland ſituated in the middle of ſo large an ocean, I was deſirous of making ſome experiments on this ſubject. For this purpoſe I had a poſt about 10 foot long erected in a convenient place in the harbour before James's fort, which was the propereſt ſituation that could be found, being to the leeward part of the iſland, where ſhips may ride at anchor ſafely all the year round.

One ſide of it was painted black, over which white ſtrokes were painted at the diſtance of 3 inches, which

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which were marked with the figures 1, 2, 3, &c. according to the order of the ſtrokes, reckoning upwards from the bottom. The water ſunk down to about the figure 0 at the new and full moons; but as the water would often ſink lower than this by the continual undulation, which it has even in the calmeſt times, and as it was by taking a medium between the greateſt and leaſt heights of the water by the ſide of the poſt in this undulation that I was to infer the true and proper height, I was therefore obliged to have the poſt lengthened by a piece at the bottom marked with ſtrokes as the poſt it ſelf, only with this difference, that the figures were ſet on from 0 downwards, as in the poſt they were ſet from 0 upwards. The obſervations where the water ſunk below 0 were reckoned minus with reſpect to thoſe where it roſe above 0, which were reckoned plus: and a proper regard was had to this difference, in inferring the true height, in ſuch circumſtances, from a medium between ſeveral obſervations of the alternate riſe and fall of the water.

But here you will perhaps think it incumbent upon me to clear my ſelf from an objection, which at firſt ſight may ſeem to render dubious the whole of my experiments. The alternate riſe and fall of the water is generally ſo conſiderable that any one would be apt to conclude it impoſſible to find the true height of the water to a ſufficient degree of exactneſs. In anſwer to this objection I can truly affirm, that I always found the mediums of each ſucceſſive riſe and fall to agree very nearly together, except in very great ſwells; from whence I was naturally led to conclude, that, by taking the medium of a great number of ſuch obſervations

vations, I ſhould obtain the true height of the water to a conſiderable degree of exactneſs. I therefore generally made 40 or 50 obſervations, and ſometimes more than 100, if the riſe and fall of the water ſeemed very irregular. And that ſuch a method of procedure renders the obſervations very conſiſtent with themſelves appears from inſpecting of them: for about the times of high and low tide, when the water is ſtationary for a long while together, different obſervations give the ſame altitude with a very little difference; and where the water is riſing or falling at the faſteſt, the obſervations will ſhew a ſenſible riſe or fall in the ſpace of a very few minutes.

In order to find if a ſenſible difference could ariſe from any peculiar difference in different people's manner of judging of the altitude of the water, I deſired Mr. Charles Maſon, to whom we are indebted for a moſt excellent obſervation of the tranſit of Venus at the Cape of Good Hope, to obſerve the water at the ſame time I did, and in the reſult of trials made at different times we ſeldom differed more than $\frac{1}{10}$ of one of the diviſions of the poſt, and never $\frac{2}{10}^{\text{ths}}$, that is never ſo much as half an inch. I cannot on this occaſion omit doing Mr. Maſon the juſtice to acknowledge the advantage I received from his frequent aſſiſtance in making of theſe obſervations, which it was in a manner impoſſible for one to have compleated alone, on account of the almoſt conſtant attendance they required, and my living at ſome diſtance from the water ſide.

The following example of my method of making theſe obſervations may ſerve to give an idea of the whole. When the water ſunk I took its altitude on

the

the poſt at the loweſt point, and immediately as it roſe again I took it at the higheſt, and repeating the experiment in this manner, I at laſt took a mean of all the obſervations for the true height of the water. But the medium of the loweſt and higheſt which immediately ſucceeded each other ſeldom differed much from the medium of them all. The numbers on the poſt by which the altitudes were taken, are at the diſtance of 3 inches from each other as I obſerved before. ☽ November 16, 1761, 5^h 16 P.M. I took the following obſervations of the altitude of the water by the ſide of the poſt 11, 12. $9\frac{1}{2}$, $13\frac{1}{2}$. 10, $12\frac{1}{2}$. 9, $14\frac{1}{2}$. 9, $12\frac{3}{4}$. $9\frac{1}{2}$, $13\frac{1}{2}$. 10, 13. 9, 14. 9, 13. 9, 14.

The medium of all, which is 11 $\frac{4}{10}$ for the true altitude of the water. Mr. Maſon at the ſame time by about as many obſervations found 11 $\frac{5}{10}$.

Some times, when the riſe and fall of the water was very quick, inſtead of taking the more regular riſe and fall of the water, which ſucceed one another at longer intervals, I took notice of every the leaſt riſe and fall, in which caſe I had an aſſiſtant to write them down as faſt as I told him. As an example of this, ☿ December 2, 11^h 15^m A.M. by a mean of 69 obſervations taken in this manner, I found the altitude of the water to be 3 $\frac{45}{100}$; and at 11^h $21''$ A.M. by a mean of 52 obſervations taken at the more regular riſing and fallings of the water, I found the altitude to be 3 $\frac{68}{100}$.

I always looked at my watch before I began to note the height of the water, and looked at it again when I had finiſhed the experiment; the medium of the two times I ſet down as the true time of the obſervation.

obſervation. The times ſet down are exact to the minute.

What I endeavoured to attain by theſe experiments was the altitudes of high and low water, and the times of their happening. I generally began to obſerve the water ſome time before the expected time of high or low water, and continued the obſervations till the water either fell or roſe. But it appears from the experiments that the water does not vary ſenſibly for 20 minutes or more from the times of high or low water. On this account it was impoſſible to find theſe times by direct obſervation, to any degree of accuracy; I therefore took equal altitudes of the water bofore and after, from whence theſe times may be inferred with ſome degree of exactneſs; you will perceive, by the times, that many of the obſervations were made in the night. In this caſe a perſon held a lanthorn to give light to the water, and the figures on the poſt, raiſing and ſinking the lanthorn alternately, as the water roſe or fell, while I obſerved the altitude of the water by the poſt.

I think that nothing remains further to be ſaid, in explanation of the obſervations, but to take notice of the contents of each column in the table of obſervations. The firſt column contains the day of the month; the ſecond ſhews the apparent time; the next column contains the altitude of the water according to the figures on the poſt, which are each 3 inches aſunder, derived from a mean of ſeveral obſervations, the number of which is ſet down in the following column. The figures H. L. in this column ſignify that theſe are the altitudes at high and low water. The laſt column contains remarks on the ſtate of the water,

water, chiefly ſhewing what might create any degree of uncertainty in the obſervations. Some of the altitudes are marked with 2 dots thus : and ſome with 4 thus :: . The firſt mark is to ſhew that the altitudes are to be eſteemed doubtful on account of circumſtances attending them: and the ſecond mark is to ſhew that they are very doubtful.

I ſhall ſay nothing with reſpect to any concluſions that may be drawn from the above obſervations, except that the greateſt riſe and fall of the water, that I have obſerved, at the ſyſigies of the Sun and Moon, is about 13 diviſions of the poſt or 39 inches, and that the ſmalleſt riſe and fall in the quadratures, is ſomewhat leſs than 7 diviſions of the poſt, or about 20 inches; and that the mean time of high water happens $2^h\ 15^m$ after the Moon's paſſing the meridian, though in the courſe of every fortnight the ſaid interval is very much varied by the different influence of the ſun at different times, as the theory requires.

I am, Sir,

Your moſt obedient,

Humble ſervant,

Nevil Maſkelyne.

St. Helena, Jan.
26, 1762.

Obſervations of the Tides made in the Harbour at James's Fort, St. Helena, *by the Rev.* Nevil Maſkelyne, *A. M. F. R. S.*

Read November 18, 1762.

1761.

Day of obſervation.	Apparent time	The height in diviſions and tenths	No. of obſervations.	N. B. The height is ſet down according to the diviſions on the poſt, each of which is 3 inches.
Nov.	h			
♃ 12.	8 56 A. M.	1 $\frac{1}{6}$	L 17	
	9 32 A. M.	1, 8	34	
	9 52 A. M.	2 $\frac{1}{4}$	18	
	10 37 A. M.	4, 0	16	
	0 58 P. M.	11	16	
	2 27 P. M.	12, 4	H 55	
	3 29 P. M.	12	18	
	3 49 P. M.	11, 3	16	
	4 32 P. M.	9, 4	20	
	8 26 P. M.	1	L	
	9 54 P. M.	2 $\frac{1}{2}$		
♀ 13. High ſurf.	6 45 A. M.	4, 8	38	
	7 24 A. M.	3, 3	36	
	7 57 A. M.	2, 5	12	
	9 21 A. M.	1, 5	L 12	
	9 32 A. M.	2, 0	20	
	1 26 P. M.	10, 9	28	
	3 21 P. M.	13, 3	H 22	
	3 54 P. M.	12, 8	26	
	6 35 P. M.	6, 3	20	

Day of obſervation.	Apparent time			The height.		
Nov.	h	'				
♄ 14.	9	25	A. M.	2		8
	10	12	A. M.	1, 1	L	8
	10	53	A. M.	2, 0		14
	3	48	P. M.	12, 8	H	22
	4	24	P. M.	12, 6		22
	5	37	P. M.	10, 3		
	7	57	P. M.	4, 5		
☉ 15.	3	52	A. M.	12, 3		12
	4	49	A. M.	12, 3	H	14
	5	32	A. M.	11, 3		8
	6	8	A. M.	10 ½		32
	7	46	A. M.	5, 3		18
	10	17	A. M.	0, 1	L	34
	11	22	A. M.	0, 4		
	11	37	A. M.	1, 5		
	0	21	P. M.	3, 5		18
	1	19	P. M.	5, 7		24
	1	53	P. M.	6, 97		18
	3	4	P. M.	10, 3		20
	3	17	P. M.	10, 5		20
	4	28	P. M.	12, 5	H	24
	5	2	P. M.	12, 0		24
	5	50	P. M.	11, 6		44
	6	37	P. M.	10, 3		16
	7	38	P. M.	8		10
	7	53	P. M.	7, 3		24
	8	4	P. M.	7		14
☽ 16.	5	47	A. M.	11, 6	H	22
	6	32	A. M.	11, 0		18
	8	0	A. M.	7		24
	8	50	A. M.	5, 6		16
	9	15	A. M.	4, 1		30
	10	5	A. M.	2, 44		18
	10	50	A. M.	1, 46		13
	11	25	A. M.	0, 8	L	24
	11	39	A. M.	1, 5		40

Day of obſervation.	Apparent time	The height.	
Nov.	h ′		
☽ 16.	11 53 A. M.	1, 9	26
	0 40 P. M.	2, 41	24
	1 15 P. M.	4, 03	16
	1 21 P. M.	4, 0	17
	1 36 P. M.	4, 14	33
	1 54 P. M.	5, 1	24
	2 47 P. M.	7, 1	23
	4 17 P. M.	10, 55	20
	5 16 P. M.	11, 4	20
	5 39 P. M.	11, 8	H 29
	6 9 P. M.	11, 7	33
	6 44 P. M.	11, 3	19
	8 31 P. M.	7, 5	14
	8 45 P. M.	7, 06	17
	9 55 P. M.	5, 06	24
	10 53 P. M.	3, 42	32
	11 30 P. M.	2, 6	L 34
♂ 17.	0 34 A. M.	2, 86	35
	1 13 A. M.	3, 51	36
	6 59 A. M.	9, 9	26
	10 37 A. M.	3, 7	41
	0 22 P. M.	2, 3	21
	0 57 P. M.	1, 75	24
	1 20 P. M.	2, 7	26
	4 22 P. M.	8, 4	28
	6 54 P. M.	11, 0	H 22
	7 36 P. M.	10, 94	31
	9 20 P. M.	8, 56	26
	9 27 P. M.	8, 3	14
	9 46 P. M.	7, 84	22
☿ 18.	6 23 A. M.	9, 68	51
	7 4 A. M.	9, 9	28
	7 33 A. M.	9, 95	H 41
	8 0 A. M.	9, 52	56
	9 18 A. M.	7, 77	26
	9 59 A. M.	7, 1	21

☿ 18.

Day of obſervation.	Apparent time	The height.		
Nov.	h ′			
☿ 18.	11 21 A. M.	5, 03	38	
	0 59 P. M.	3, 14	44	
	1 24 P. M.	3, 13	26	
	1 42 P. M.	3, 14	L 24	
	2 16 P. M.	3, 73	22	
	3 48 P. M.	5, 13	23	
	5 4 P. M.	6, 92	27	
	5 15 P. M.	7, 1	10	
	7 26 P. M.	10, 36	H 56	
	7 49 P. M.	10, 2	41	
	8 23 P. M.	10, 1	20	
♃ 19.	5 47 A. M.	6, 72	30	
	6 1 A. M.	7, 3	40	
	6 24 A. M.	7, 93	35	
	7 37 A. M.	9, 2	18	
	7 59 A. M.	9, 52	22	
	8 15 A. M.	9, 75	H 36	
	8 38 A. M.	9, 52	29	
	9 7 A. M.	8, 92	31	
	10 28 A. M.	7, 16	25	
	10 49 A. M.	7, 12	25	
	2 25 P. M.	2, 67	L 27	
	2 48 P. M.	3	26	
	3 17 P. M.	2, 83	36	
	6 4 P. M.	6, 8	18	
	6 19 P. M.	7, 1	34	
	8 22 P. M.	9, 9	36	
	8 53 P. M.	10, 5	H 29	
	9 23 P. M.	10, 2	27	Surf high, and riſe and fall of water very irrregular; there ſeems to be a great ſwell at ſea.
	11 14 P. M.	8, 87	15	
♀ 20.	0 10 A. M.	7, 64	39	
	6 13 A. M.	5, 55	20	
	7 22 A. M.	7, 07	27	
	9 22 A. M.	9, 2	42	
	9 41 A. M.	10, 3::	19	
	9 56 A. M.	9, 6	H 36	

Day of obſervation.	Apparent time			The height.				
	h	′						
Nov.								
♀ 20.	10	14	A. M.	9,	5		22	
	10	54	A. M.	9,	0		33	
	0	28	P. M.	6,	7		48	
	1	21	P. M.	6,	1		30	
	1	37	P. M.	5,	4		32	
	2	52	P. M.	3,	8		31	
	3	28	P. M.	3,	5		24	A great ſwell this day.
	3	57	P. M.	2,	8	L	32	
	4	33	P. M.	3,	2		21	
	6	43	P. M.	6,	4		38	
	7	2	P. M.	7,	0		21	
	9	55	P. M.	11,	9	H	32	
	10	40	P. M.	11,	5		30	
	10	55	P. M.	11,	5		38	
♄ 21.	7	32	A. M.	6			18	
	8	9	A. M.	7,	1		36	
	10	57	A. M.	10,	2	H	44	High ſwell.
	11	43	A. M.	10,	0::		26	Sea a little calmer.
	11	46	A. M.	9,	4		13	
	1	14	P. M.	7,	3		121	
	2	47	P. M.	4,	8		38	A great ſwell this day; obſervations very uncertain from the 19th day.
	3	39	P. M.	3,	5		30	
	4	32	P. M.	2,	9	L	18	
	7	30	P. M.	6,	1		36	
	8	23	P. M.	7,	5		32	
☉ 22.	8	55	A. M.	7,	3		33	
	11	9	A. M.	11,	5		34	Swell ſtill great, but the riſe and fall more regular than of late.
	11	42	A. M.	11,	5	H	27	
	2	32	P. M.	7,	2		108	
	3	46	P. M.	5,	4		70	
	5	24	P. M.	3			34	
	6	0	P. M.	2,	7	L	36	
	6	30	P. M.	2,	7		46	
☽ 23.	9	33	A. M.	7,	1		54	The ſwell a good deal abated and riſe and fall pretty regular.

☽ 23

Day of obſervation.	Apparent time	The height.		
Nov.	h ′			
☽ 23.	0 4 P. M.	10, 5	33	
	0 27 P. M.	11, 0	H 46	The riſe and fall very regular.
	1 10 P. M.	11, 0	43	
	3 29 P. M.	6, 9	59	
	6 36 P. M.	2	37	
	6 59 P. M.	1, 7	L 35	Great ſwell, with a ſtrong wind from the ſea, renders the obſervation ſomewhat leſs certain.
	7 37 P. M.	1, 9	49	
	9 40 P. M.	6, 8	45	
♂ 24.	7 4 A. M.	2, 1	L 65	Sea very quiet and riſe and fall very regular.
	7 59 A. M.	2, 6	56	
	10 2 A. M.	6, 4	48	
	10 24 A. M.	7, 2	44	
	0 47 P. M.	11, 1	43	
	1 11 P. M.	11, 1	H 57	
	1 30 P. M.	11, 0	53	
	2 52 P. M.	8, 9	31	
	3 45 P. M.	7, 6	47	
	4 18 P. M.	6, 4	71	
	6 56 P. M.	1, 9	54	
	7 28 P. M.	1, 6	L 50	
	8 7 P. M.	2, 0	52	
☿ 25.	7 52 A. M.	1, 7	L 54	
	8 21 A. M.	1, 7	47	
	11 4 A. M.	7, 3	56	
	0 55 P. M.	11, 0	34	
	1 58 P. M.	12, 0	H 35	
	2 17 P. M.	12, 0	34	
	2 46 P. M.	11, 0	30	
	4 50 P. M.	6, 7	31	
	7 53 P. M.	0, 7	L 48	
	8 42 P. M.	1, 3	41	
	11 4 P. M.	6, 7	49	
♃ 26.	7 20 A. M.	1, 7	73	
	8 3 A. M.	1, 3	L 41	

Day of obſervation.	Apparent time	The height.		
Nov.	h ′			
♃ 26.	8 11 A. M.	1, 5	36	
	9 1 A. M.	2, 3	42	
	11 23 A. M.	6, 4	36	A great ſwell.
	2 15 P. M.	11, 7	37	
	2 46 P. M.	11, 8	H 28	
	3 25 P. M.	10, 5	49	
	5 25 P. M.	6, 7	41	A great ſwell.
♀ 27.	7 42 A. M.	1, 5	36	A great ſwell and high ſurf but in the intervals very calm.
	9 2 A. M.	0, 9	L 55	Great ſwell and high ſurf.
	9 37 A. M.	1, 2	50	Great ſwell.
	8 6 A. M.	1, 6	47	Ditto.
	0 5 P. M.	6, 55	65	
	0 43 P. M.	7, 45	62	Swell ſo great, and riſe and fall ſo irrregular makes obſerving very uncertain.
	2 58 P. M.	11, 0	H 63	Swell abated, and riſe and fall more regular.
	3 33 P. M.	11, 0	62	
	4 20 P. M.	10,. 4	86	
♄ 28.	7 40 A. M.	3, 0::	38	Swell great, but comes in ſlower, with longer intervals, ſurf inconſiderable, obſerving very uncetain.
	8 39 A. M.	1, 1	40	
	9 8 A. M.	0, 5	53	
	9 39 A. M.	0, 1	L 67	
	10 3 A. M.	0, 7	41	
	0 48 P. M.	6, 8	49	Sea calm, and riſe and fall very regular.
	3 17 P. M.	10, 8	26	
	3 42 P. M.	11, 0	H 46	
	4 4 P. M.	11, 0	39	
	4 32 P. M.	10, 7	75	
	6 20 P. M.	6, 8	38	
☉ 29.	7 58 A. M.	3, 6	60	
	10 6 A. M.	1, 0	L 45	
	10 31 A. M.	1, 0	51	
	0 21 P. M.	3, 6	40	
	2 24 P. M.	8, 2	35	

☉ 29.

Day of obſervation.	Apparent time	The height.	
Nov.	h '		
☉ 29.	4 19 P. M.	11, 3	H 35
	4 45 P. M.	11, 1	41
	6 20 P. M.	8, 6	36
☽ 30.	4 23 A. M.	10, 7	H 55
	5 7 A. M.	10, 2	74
	6 13 A. M.	9, 0	43
	7 39 A. M.	6, 0	44
	7 58 A. M.	5, 0	68
	9 54 A. M.	1, 8	L
	10 26 A. M.	1, 9	53
	10 54 A. M.	2, 0	56
	11 27 A. M.	2, 3	75
	0 58 P. M.	4, 4	73
	1 13 P. M.	5, 1	54
	1 32 P. M.	5, 5	43
	3 22 P. M.	9, 3	40
	4 19 P. M.	10, 3	44
	4 51 P. M.	10, 7	H 42
	5 34 P. M.	10, 4	64
	6 23 P. M.	9, 6	57
	6 44 P. M.	9, 1	53
	8 18 P. M.	5, 5	45
Decem.			
♂ 1.	8 36 A. M.	5, 2	33
	9 45 A. M.	3, 5	56
	10 49 A. M.	2, 2	L 61
	11 23 A. M.	2, 3	75
	11 25 A. M.	2, 3	30
	0 22 P. M.	2, 7	49
	0 57 P. M.	3, 7	79
	2 13 P. M.	5, 4	48
	3 54 P. M.	8, 7	55
	5 40 P. M.	10, 4	H 42
	6 19 P. M.	10, 0	50
	7 13 P. M.	8, 5	57
	8 54 P. M.	6, 6	62

Day of obſervation.	Apparent time	The height.		
Dec.	h ′			
☿ 2.	9 52 A. M.	4, 9	52	
	10 15 A. M.	4, 3	93	
	11 15 A. M.	3,45		By a mean of 69 obſervations taken as faſt as poſſible at every the leaſt riſe and fall.
	11 21 A. M.	3, 68		Taken from the greateſt and more regular riſes and falls by a mean of 52 obſervations.
	11 54 A. M.	3, 1	L115	
	0 33 P. M.	3, 3	74	
	1 34 P. M.	4, 1	87	
	3 51 P. M.	6, 2	95	
	4 12 P. M.	7, 1	127	
	5 57 P. M.	9, 4	94	
	6 21 P. M.	9, 9	H 73	A great ſwell.
	6 49 P. M.	9, 7	91	A greater ſwell, obſerving ſomewhat uncertain all this day.
	7 55 P. M.	8, 8	43	A very great ſwell.
♃ 3.	7 47 A. M.	9, 3	54	A great ſwell; but very calm at times; obſerving upon the whole ſomewhat uncertain.
	8 20 A. M.	8, 5	55	

The violence of the ſwell has ſo looſened the nails and twiſted the iron of the poſt, that it was neceſſary to take it off and repair it.

♄ 5. The poſt was ſet up again as near the former height as could be judged.

	5 31 P. M.	5, 8	43
	6 49 P. M.	7, 7	40
☉ 6.	7 44 A. M.	8, 3	105
	9 2 A. M.	9, 2	47

Day of observation.	Apparent time				The height.				
	h	′							
Nov.									
☉ 6.	10	14	A.	M.	9,	5	H	50	
	11	4	A.	M.	9,	0		59	
	11	49	A.	M.	8,	1		61	
	1	2	P.	M.	7,	3		49	
	3	29	P.	M.	4,	0		42	
	3	53	P.	M.	3,	8	L	73	
	4	25	P.	M.	4,	0		61	A great ſwell in theſe laſt obſervations, yet the riſe and fall pretty regular at the ſmaller ſwells, and at times the ſea pretty calm.
	6	19	P.	M.	5,	4		57	
	6	31	P.	M.	5,	1		59	
	6	46	P.	M.	6,	3		36	
	7	5	P.	M.	7,	1		75	
☽ 7.	8	7	A.	M.	7,	4		47	
	8	24	A.	M.	7,	8		62	
	10	9	A.	M.	9,	4		41	
	10	39	A.	M.	10,	0	H	69	
	11	12	A.	M.	9,	7		47	
	1	5	P.	M.	7,	8		69	
	4	9	P.	M.	3,	4		50	
	4	46	P.	M.	3,	2	L	57	
	5	30	P.	M.	3,	6		60	A great ſwell in this obſervation, but all the others tolerably good.
	8	27	P.	M.	8,	0:		48	
♂ 8.	9	32	A.	M.	8,	5		50	
	11	14	A.	M.	10,	3		48	
	11	42	A.	M.	10,	5	H	49	
	0	13	P.	M.	10,	5		72	
	2	0	P.	M.	8,	5		54	
	3	51	P.	M.	5,	0		85	
	5	26	P.	M.	3,	0		46	
	5	57	P.	M.	2,	7		69	
	6	30	P.	M.	3,	0		49	
☿ 9.	10	35	A.	M.	9,	9		66	
	0	19	P.	M.	11,	7		71	
	0	37	P.	M.	11,	8	H	89	
	1	0	P.	M.	11,	8		72	
	2	44	P.	M.	9,	4		66	

Day of obſervation.	Apparent time	The height.		
Dec.	h '			
☿ 9.	3 26 P. M.	8, 2	54	
	6 12 P. M.	2, 5	L 31	Sea very ſmooth all this day.
	6 38 P. M.	2, 6	57	
♃ 10.	7 32 A. M.	2, 6	L 48	
	8 1 A. M.	2, 7	45	
	11 27 A. M.	9, 9	39	
	1 13 P. M.	12, 0	H 72	
	1 33 P. M.	12, 0	81	
	1 45 P. M.	12, 0	81	
	3 1 P. M.	10, 0	46	
	6 51 P. M.	2, 2	67	
	6 59 P. M.	1, 9	47	
	7 38 P. M.	1, 6	L100	
	8 5 P. M.	1, 8	119	
♀ 11.	8 5 A. M.	1, 2	L104	
	8 9 A. M.	1, 1	44	
	8 32 A. M.	1, 4	76	
	11 51 A. M.	9, 4	40	
	2 17 P. M.	12, 5	H 47	
	2 35 P. M.	12, 5	47	
	4 51 P. M.	8, 0	37	
	5 23 P. M.	6, 7	31	
	5 58 P. M.	4, 2	41	
	8 19 P. M.	1, 0	L 81	
	8 59 P. M.	1, 4	66	
♄ 12.	7 46 A. M.	1, 7	101	
	8 7 A. M.	1, 5	76	
	8 37 A. M.	1, 26	134	
	9 1 A. M.	1, 12	L 78	
	9 26 A. M.	1, 3	69	
	9 56 A. M.	1, 7	51	
	10 16 A. M.	2, 5	59	
	0 19 P. M.	8, 5	45	
	2 32 P. M.	13, 1	54	
	2 51 P. M.	12, 9	89	

♄ 12.

Day of obſervation.	Apparent time			The height.			
Dec.	h	′					
♄ 12.	3	7	P. M.	13, 0	H	46	
	3	36	P. M.	12, 7		55	
	4	27	P. M.	11, 0		39	
	5	12	P. M.	9, 2		43	
	5	29	P. M.	8, 5		54	
☉ 13.	7	29	A. M.	3, 7		67	
	9	13	A. M.	0, 9		46	
	9	36	A. M.	0, 6	L	56	
	9	57	A. M.	0, 9		46	
	11	38	A. M.	3, 8		48	
	0	12	P. M.	6, 0		50	
	0	50	P. M.	7, 9		43	
	3	46	P. M.	13, 5	H	53	
	4	10	P. M.	13, 3		44	
	6	15	P. M.	8, 7		43	
	6	37	P. M.	7,95		62	
☽ 14.	7	42	A. M.	5, 0		88	
	9	49	A. M.	0, 6		47	
	10	12	A. M.	0, 3	L	52	
	10	29	A. M.	0, 3		50	
	11	15	A. M.	0, 8		45	
	0	51	P. M.	5, 0		46	
	3	55	P. M.	12, 0		43	
	4	18	P. M.	12, 4		58	
	4	45	P. M.	12, 4	H	50	
	5	8	P. M.	12, 3		37	
	5	41	P. M.	11, 5		30	
♂ 15.	8	46	A. M.	4,67		60	
	9	7	A. M.	3,57		40	
	10	30	A. M.	1,53		50	A great ſwell; obſerving very uncertain.
	10	59	A. M.	1,26::		52	
	11	23	A. M.	1,15	L	78	
	11	51	A. M.	1, 7		52	
	0	50	P. M.	3,24		54	
	1	4	P. M.	3, 7		54	Obſerving better.

Day of obſervation.	Apparent time	The height.	
Dec.	h ′		
♂ 15.	1 21 P. M.	4, 1	51
	1 29 P. M.	4, 64	54
	4 27 P. M.	11, 56	52
	5 45 P. M.	12, 1	H 66
	6 9 P. M.	11, 9	54
	6 27 P. M.	11, 6	24
	6 31 P. M.	11, 46	12
	6 35 P. M.	11, 43	42
	6 39 P. M.	11, 47	36
	6 43 P. M.	11, 0	32
☿ 16.	9 24 A. M.	5, 3	56
	11 25 A. M.	1, 86	49
	11 45 A. M.	1, 6	61
	0 5 P. M.	1, 54	L 67
	0 27 P. M.	1, 75	43
	2 16 P. M.	4, 9	54
	2 40 P. M.	5, 5	52
	4 28 P. M.	10, 0	52
	4 54 P. M.	11, 1	46
	5 26 P. M.	11, 5	39
	5 53 P. M.	11, 7	56
	6 12 P. M.	12, 3	H 47
	6 33 P. M.	12, 04	46
♃ 17.	10 29 A. M.	5, 05	57
	0 25 P. M.	2, 1	61
	0 48 P. M.	2, 1	L 52
	1 3 P. M.	2, 3	62
	3 6 P. M.	4, 7	43
	3 22 P. M.	5, 1	60
	6 20 P. M.	10, 9	51
	6 37 P. M.	11, 26	44
	6 55 P. M.	11, 6	H 98
♀ 18.	6 46 A. M.	9, 84	56
	7 14 A. M.	9, 83	74
	7 41 A. M.	9, 84	H 72

Day of obſervation.	Apparent time	The height.		
Dec.	h ′			
♀ 18.	8 1 A. M.	9, 84	68	
	8 26 A. M.	9, 7	70	
	8 55 A. M.	9, 17	78	
	9 14 A. M.	8, 96	54	
	11 26 A. M.	5, 3	61	
	1 28 P. M.	3, 0	72	
	1 43 P. M.	3, 0	81	
	2 3 P. M.	2, 5	L 57	
	2 28 P. M.	2, 6	56	
	2 54 P. M.	2, 9	59	
	4 8 P. M.	4, 6	64	
	4 36 P. M.	5, 3	62	
♄ 19.	6 56 A. M.	8, 2	54	
	7 30 A. M.	9, 1	51	
	7 54 A. M.	9, 1	58	
	8 29 A. M.	9, 3	61	
	8 46 A. M.	9, 65	H 62	
	9 10 A. M.	9, 5	59	
	10 15 A. M.	8, 5	53	
	10 34 A. M.	8, 14	50	
	11 49 A. M.	6, 5	57	
	2 28 P. M.	2, 8	59	
	2 57 P. M.	2, 6	59	
	3 17 P. M.	2, 5	L 49	
	3 37 P. M.	2, 8	55	
	5 51 P. M.	5, 3	49	Very ſmooth all this day.
	6 27 P. M.	6, 5	57	
☉ 20.	9 28 A. M.	10, 1	48	
	9 57 A. M.	10, 3	H 55	
	10 25 A. M.	10, 0	49	
	0 55 P. M.	6, 2	75	Swell ſo quick nothing certain can be done.
	3 45 P. M.	3, 0::	32	
	4 10 P. M.	2, 2	L 44	Swells very quick.
	4 31 P. M.	2, 6	53	Swells very quick.
	4 37 P. M.	5, 3	46	Swells very quick.

Day of obſervation.	Apparent time	The height.	
Dec.	h ′		
☽ 21.	8 6 A. M.	6, 6	54
	10 25 A. M.	10, 1	52
	10 50 A. M.	10, 15	H 45
	11 16 A. M.	10, 1	51
	11 40 A. M.	9, 9	52
	1 56 P. M.	6, 7	42
	2 24 P. M.	6, 1	55
	4 38 P. M.	3, 1	63
	5 9 P. M.	2, 7	L 51
	5 41 P. M.	2, 9	57
♂ 22.	9 8 A. M.	6, 8	53
	11 42 A. M.	10, 1	42
	0 6 P. M.	10, 5	H 52
	0 26 P. M.	10, 3	51
	2 50 P. M.	6, 8	63
	3 10 P. M.	6, 2	67
	5 31 P. M.	3, 1	59
	5 52 P. M.	2, 7	53
	6 22 P. M.	2, 5	L 56
	6 39 P. M.	2, 8	60
	7 3 P. M.	3, 2	86

XCIX. *Extract*